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Docket No. (Optional): **820601-1020**

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6/14/05

Signature – Laurie Delesandro

In re Application of
Focke, Heinz, et al.

Application Number	Filed
09/724,016	**11/28/2000**

For
Process for Producing Hinge-Lid Boxes for Cigarettes

Group Art Unit	Examiner
3721	**Tawfik, S.**

Confirmation No.:
7235

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on 02/14/2005

The fee for this Appeal Brief is (37 CFR 1.17(c) $ 500.00

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.17(a)-(d) apply.

☒ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

☐	One month (37 CFR 1.17(a)(1))	$ 120.00
☒	Two months (37 CFR 1.17(a)(2))	$ 450.00
☐	Three months (37 CFR 1.17(a)(3))	$ 1020.00
☐	Four months (37 CFR 1.17(a)(4))	$ 1590.00

☐ The extension fee has already been filed in this application.

☐ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that the applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Method of Payment:

☐ Payment is enclosed as follows:
- ☐ A check in the amount of enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached in the amount of
- ☒ The Commissioner is authorized to charge 950.00 to a Deposit Account 20-0778.
- ☒ The Commissioner is hereby authorized to charge any deficiencies in fees, or credit any overpayment to Deposit Account No. 20-0778. A duplicate copy is enclosed.

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14 June 2005
Date

Todd Deveau
Todd Deveau, Reg. No. 29,526

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Application of:	)	
	)	
Focke, Heinz et al.	)	Group Art Unit: 3721
	)	
Serial No.: 09/724,016	)	Examiner: Tawfik, S.
	)	
Filed: 28 November 2000	)	Confirmation No. 7235
	)	
For: PROCESS FOR PRODUCING HINGE-LID BOXES FOR CIGARETTES	)	

APPEAL BRIEF UNDER 37 C.F.R. § 1.192

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief under 37 C.F.R. § 1.192 is submitted in support of the Notice of Appeal filed February 14, 2005, appealing to the Board from the action of the Final Office Action, mailed September 13, 2004 (Paper No. Mail Date 08312004), finally rejecting claims 45-54 of the above referenced application.

I. REAL PARTY IN INTEREST

The real party in interest of the instant application is Focke & Co. (GmbH), a corporation organized under the laws of the Federal Republic of Germany, having a principal place of business in Siemensstraβe 10, 27283 Verden, Germany.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal. Thus, no copies of decisions rendered by a court or the Board in any judicial proceeding are included in a Related Proceedings Appendix.

III. STATUS OF THE CLAIMS

Claims 45-54 are pending in the application and stand finally rejected under 35 U.S.C. § 103(a). Appellants hereby appeal the foregoing final rejection of these claims.

IV. STATUS OF AMENDMENTS

This application has a protracted prosecution history. It was filed November 28, 2000 claiming priority on DE application 19957415.4 filed November 29, 1999. A Preliminary Amendment was filed with the application deleting claims 1-9 and adding new claims 10-28. The application received a restriction requirement in the first Office Action (Paper No. 7) requiring restriction to one of two groups of claims with Applicants electing the Group I claims 10-19 drawn to a process for producing a dimensionally stable pack made of cardboard. Claims 10, 14 and 15 were rejected under 35 USC §102(b) as anticipated by Mattei et al. (4,887,408), and claims 11-13 and 16-19 were rejected over Mattei et al. in view of McDaniel (4,256,526).

In a Response and Amendment submitted by fax on December 23, 2002 Applicants amended claims 10-13, cancelled claims 15-28, and added new claims 29-44. A Final Office Action (Paper No. 10) was mailed February 6, 2003 in which claims 32-44 were treated as withdrawn from consideration for being directed to a non-elected invention, claims 10, 14, 15 and 29-31 were rejected under 35 USC §102(b) as anticipated by Mattei et al (4,887,408), and

the rejection of claims 11-13 and 16-19 under 35 USC §103(a) over Mattei et al in view of McDaniel (4,256,526) continued.

Applicants submitted by facsimile on June 6, 2003 their Response and Amendment and Request for Reconsideration to the Final Office Action cancelling claims 32-35 and 40-44, amending claim 36 and adding claims 45-46. Applicants requested reconsideration of the treatment of claim 36 and its dependent claims 37-39 as withdrawn. The reasoning given for treating the claims as withdrawn was they did not include a particular limitation. Applicants responded showing that claim 36 did in fact contain the limitation alleged as not included. Applicants questioned the rejection of claim 15 that had been cancelled. Lastly, Applicants requested reconsideration of the rejection of the claims in view of Mattei et al. as being based upon an incorrect reading of Mattei et al. The rejection was based on Mattei et al. disclosing two sealing stations 45 and 57 for sealing tabs of a wrapper placed around, for example a cigarette pack. Applicants pointed out that one of the sealing stations of Mattei et al. was for sealing one set of tabs of the wrapper (side tabs) and the second sealing station was for sealing a different set of tabs of the wrapper (end tabs). Thus, Mattei et al. disclosed sealing the side tabs only once and sealing the end tabs only once and did not disclose Applicants' claimed two-step process for sealing a wrapper around a pack including first folding and temporarily sealing a given set of tabs of the wrapper around the pack and transporting the pack to a second station where the same given set of tabs were sealed a second time, permanently, and wherein this two-step process is carried out for both the side tabs and the end tabs. Accordingly Mattei et al could not support the rejection of the claims based upon Mattei et al. anticipating Applicants' claimed process.

An Advisory Action (Paper No. 14) issued June 18, 2003 continuing to reject the claims, stating the "examiner still believes that Mattei's reference discloses first and second sealing

stations 45 and 57". The Advisory Action did not indicate whether Applicants' Response and Amendment and Request for Reconsideration would be entered.

Applicants responded submitting a Request for Continued Examination and resubmitting a revised Response and Amendment and Request for Reconsideration further adding new claims 47-51, having a certificate of mailing of August 5, 2003. A Restriction Requirement (Paper No. 18) was mailed October 3, 2003 classifying the claims into three groups: 1) Group I, claims 10-14 and 29-31; 2) Group II, claims 36-39; and 3) Group III, claims 45-51. Applicants elected the Group III claims 45-51 in a Response having a certificate of mailing dated November 25, 2003.

An Office Action (Paper No. 21) was mailed January 21, 2004 allowing claims 48-51, rejecting claims 45-47 under 35 USC §112, second paragraph, and stating claims 45-47 would be allowable if re-written to overcome the §112 rejection.

On April 28, 2004, Applicants submitted an Information Disclosure Statement enclosing references from an Office Action dated March 26, 2004 issued by the Chinese Patent Office in connection with a related application. On May 19, 2004 Applicants submitted their Response and Amendment to the Office Action (Paper No. 21), cancelling claims 10-14, 29-31 and 36-39, amending claims 45-47 to address the rejection under §112, amending claim 48 to address a typographical error, adding new claims 52-54, amending the specification, and submitting a substitute specification. Claims 45-54 were left pending in this application as a result of this response.

A Final Office Action (Paper No. 08312004) issued September 13, 2004 rejecting claims 45-52 under 35 USC §103(a) over Chinese patent (CN 1146415 A) in view of (WO 9856662 A), both references having been submitted by Applicants from the corresponding Chinese Office

Action. Claims 53-54 were rejected under 35 USC §103(a) further in view of McDaniel (4,256,526).

Applicants submitted a Response and Request for Reconsideration by facsimile on November 15, 2004 to the Final Office Action. No further amendments were made to the claims in this Response. Applicants requested reconsideration and withdrawal of the rejection. Applicants pointed out how the references failed to disclose Applicants' claimed two-step sealing process and the rejection was based upon a misreading of the Chinese patent '415. To assist in interpreting the Chinese patent, Applicants submitted a copy of U.S. 5,701,725 that has the same priority claim as the Chinese patent.

An Advisory Action (Paper No. 11292004) ("First Advisory Action") issued December 1, 2004 maintaining the final rejection of claims 45-54 and commenting the "examiner further believes that the Chinese patent '415 disclose the pre-sealing step (Fig. 1; via station 49 and laser beam 53) and the permanently sealing (Fig. 1; via station 10 by arrow 6 and 46) to finish the pre-sealing step".

Applicants responded by submitting a further Request for Reconsideration by facsimile on February 14, 2005 explaining how the citations to Chinese patent '415 did not support a rejection of Applicants' two-step process of a pre-sealing step followed by a permanent sealing step for sealing the same tabs of a wrapper, as claimed. Instead, station 49 is for sealing one set of tabs and station 10 is for sealing a different set of tabs. No amendments to the claims were presented in this further Request. Applicants simultaneously filed their Notice of Appeal by facsimile on the same day and paid the appeal fee.

Another Advisory Action (Paper No. 03092005) ("Second Advisory Action") issued March 14, 2005 continuing the final rejection of the claims. This Action included the comment:

> "the examiner still believes that the applied reference '415 or the English equivalent 5,701,725 discloses the claimed thermally pre-sealing the side tabs (Fig. 1; via the laser beams 53) and thermally pre-sealing bottom and top tabs (Fig. 1; via compressing U-shaped pocket 43), it is inherent by compressing on the folded top and bottom tabs will cause some energy, which considered as thermally pre-sealing top and bottom tabs; permanently sealing the side tabs (Fig. 1; via by folding the top and bottom tabs will cause in finishing the free end portions of the side seal to be folded along with the bottom and top tabs); and permanently sealing the bottom and top tabs (Fig. 1; via laser source 50)".

This comment provided a new and different interpretation of the Chinese patent '415 from that presented in the Final Office Action and the prior Advisory Action. As shown below, the new citations to Chinese patent '415 in the Second Advisory Action do not support the rejection of the claims either.

The claims on appeal attached hereto in the Claims Appendix, Appendix A, namely claims 45-54, thus reflect the current status of the claims as amended and entered through the Response and Amendment submitted by mail dated May 19, 2004, the last time they were amended and as rejected by the Final Office Action (Paper No. 08312004) issued September 13, 2004.

As can be seen, no affidavits or evidence under §§1.130, 1.131 or 1.132 were submitted. Thus, none are included in an Evidence Appendix hereto. For ease of reference, a highlighted copy of U.S. 5,701,725 is attached hereto at Appendix C.

V. SUMMARY OF CLAIMED SUBJECT MATTER

In view of the submission and entry of a Substitute Specification, Applicants refer to the Substitute Specification in their summary of the claimed subject matter below. For convenience, and ease of reference, the Substitute Specification is attached hereto at Appendix B.

The embodiment of the present application relates to a process for producing (dimensionally stable) packs made of (thin) cardboard with an outer wrapper made of thin film,

in particular a hinge-lid box for cigarettes. The invention concerns measures for the improved production of such packs, in particular hinge-lid packs for cigarettes. The object of the invention is to ensure an improved, particularly fold-free, appearance of the outer wrapper by virtue of the film being shrunk. Substitute Specification, page 1, lines 6-8 and 21-23.

The use of shrink-wrap film as the outer wrapper of the cigarette pack has been attempted, but problems resulted. For example, the transfer of heat and pressure in the region of the pack tower and in the region of the sealing path results in an undesired shrinkage of the outer wrapper before the folding tabs have been completely and permanently sealed. The outer wrapper is shrink-wrap film, and is thus a thermally sealable film with a heightened shrinkage characteristic when subjected to heat.

The problem of the prior art solved by the present invention is that, on the one hand, heat and pressure must be applied for the thermal sealing of the folding tabs of the outer film, and, on the other hand, however, premature shrinkage resulting from the introduction of heat must be avoided because the actual shrinkage process should not occur until the outer wrapper has been folded.

The present disclosure and claims are directed to overcoming these problems. In particular, they are directed to producing an extensively wrinkle-free and correct wrapping of a cigarette pack with shrink-wrap film. The invention essentially is a method to provide a pack with an outer wrapper that has a fold-free appearance.

The present invention:

> [i]s based on the finding that, upon initiation of the shrink-wrapping and/or heat treatment, the outer wrapper has to be completely finished; in other words all the folding tables have to be folded into the correct position and fixed in said position. Substitute Specification, Page 2, lines 3-5.

In conventional processes, the tabs of the outer wrap are sequentially connected with large-surface-area sealing, which initiates the shrink-wrapping process, prior to further folding steps. Substitute Specification, Page 2, lines 6-10. Yet, this results in the permanent deformation of the outer wrapper, since all the folding steps are not completed prior to shrink-wrapping. Substitute Specification, Page 2, lines 10-12.

The present invention overcomes this disadvantage in at least one way by utilizing a set of folding and temporary maintaining steps until the outer wrapper has been fully folded:

> ...as a result of the preliminary sealing and/or preliminary tacking, fixing of the outer wrapper in the correct folding position is completed without a shrink-wrapping treatment being initiated by said tacking and/or preliminary sealing. Substitute Specification, Page 2, lines 13-15.

Thus, the present invention comprises two distinct steps to provide the fold-free appearance of the outer wrapper, and to limit the initiation of the heat-shrinking of the outer wrapper until the folding steps are completed:

- In a sealing or tacking process, the formed folding tabs of the outer wrapper are connected to each other only temporarily,
- Then the completely folded and finished packs with the temporarily connection tabs are fed to a sealing apparatus for full-surface and permanent seals to the folding tabs of the outer wrapper.

Accordingly, in the invention, the very sensitive outer wrapper (film) is temporarily fixed in place after each folding process. At this time, the packs may remain in a folding station of the apparatus. Preferably, the packs are held in a positive-locking manner in pockets of folding turet 35, and in folding path 45.

The process recited in the claims, thus, overcomes these problems by incorporating a two-step sealing process for each set of tabs to be sealed, namely the side tabs and the end tabs (top and bottom). This process is referred to in independent claims 45 and 48 as connecting (claim 45)/permanently pre-sealing (claim 48) tabs followed by permanently sealing the same tabs. Claim 48 further describes the permanent sealing of the tabs as being accomplished by full-surface sealing of the tabs. The first step of pre-sealing/connecting the tabs is intended to connect the tabs only for a limited amount of time until permanent sealing is subsequently accomplished.

Independent claims 45 and 48 are the only independent claims in issue. Independent Claim 45 recites a process for producing a pack (10) made of thin cardboard with an outer wrapper (13) made of thermally sealable and shrinkable material having folding tabs, including side tabs (20, 21), and transverse folding tabs (23, 24) and longitudinal folding tabs (25, 26) assigned to an end wall (18) and a base wall (19) of the pack, the outer wrapper enclosing the pack and the folding tabs thereof being connected to one another in the region of overlaps by thermal sealing, comprising the steps of:

(a) providing a blank for forming the outer wrapper (13) and folding said blank around the pack (10) in a tubular shape such that the side tabs (20, 21) of the outer wrapper overlap one another,

(b) then connecting (27, 25, sealing tool 41) the side tabs (20, 21) to one another in the region of the overlap (see, Fig. 3, or alternatively, Fig. 4),

(c) thereafter folding (45, 46, 47) the transverse (23, 24) and longitudinal (25, 26) folding tabs assigned to the end wall (18) and the base wall (19) such that the transverse folding tabs (23, 24) and the longitudinal (25, 26) folding tabs partially overlap each other,

(d) then connecting (51, 52) the transverse (23, 24) and longitudinal (25, 26) folding tabs to one another in the region of their overlap (see, Fig. 5),

(e) next moving the packs upward into a pack tower (49) , where the side tabs (20, 21) are permanently sealed (54) in the region of their overlap by full-surface sealing (22, Fig. 1),

(f) thereafter transporting the pack laterally to a sealing path (50) where the transverse (23, 24) and longitudinal (25, 26) folding tabs are surface sealed (55, see Fig. 2), and

(g) the packs with the finished and sealed outer wrapper are then conveyed through a shrinking station (56), in the region of which the large-surface front walls and rear walls of said packs are subjected to a shrinking process for the outer wrapper by means of surface heat transfer (57, 58, 59). Support for Claim 45 is found in the present application, Substitute Specification, page 5, line 19 through page 8, line 3, and also in Figs. 1-6.

Independent Claim 48 is similarly, but not identically worded, as Claim 45. Claim 48 recites a process for folding and sealing an outer wrapper (13) on a dimensionally stable pack (10) comprising the following steps:

providing a shrink wrapping film for forming the outer wrapper (13);

wrapping the shrink wrapping film around the pack to form side tabs (20, 21), bottom tabs (23, 24, 25, 26), and top tabs (23, 24, 25, 26);

causing the side tabs (20, 21) to overlap (22) one another;

thermally pre-sealing (27, 28, 41) the side tabs (20, 21) (see, Fig. 3, or alternatively Fig. 4);

causing (45, 46, 47) the bottom tabs to overlap one another and the top tabs to overlap one another;

thermally pre-sealing (51, 52) the overlapping bottom and top tabs (23, 24, 25, 26) (see Fig. 5);

permanently sealing (54) the side tabs (20, 21, see Fig. 1); and

permanently sealing (50, 55) the bottom and top tabs (23, 24, 25, 26, see Fig. 2).

Support for Claim 48 is found in the present application, Substitute Specification, also at page 5, line 19 through page 8, line 3, and Figs. 1-6.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 45-54, stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Chinese patent (CN 1146415 A) in view of WO 9856662 A.

The Final Office Action (Paper No. 08312004) asserts "'415 discloses a process for producing a pack made of thin cardboard comprising the steps of providing a blank (Fig. 1; via 8) for forming the outer wrapper and folding said blank around the pack (3) in a tubular shape (Fig. 1) such that the side tabs of the outer wrapper overlap one another (via 23); then connecting the side tabs to one another in the region of the overlap thereafter folding the transverse and longitudinal folding tabs assigned to the end wall and the base wall such that the transverse folding tabs and the longitudinal folding tabs partially overlap each other (Fig. 1; via by the cross side of the pack); then connecting the transverse and longitudinal folding tabs to one another in the region of their overlap (Figs. 1 and 7); next moving the packs upward into a pack tower, where the side tabs are permanently sealed in the region of their overlap by full-surface sealing (Figs. 1 and 3; via 53); thereafter transporting the pack laterally to a sealing path where the transverse and longitudinal folding tabs are surface sealed (Fig. 1; via station 37 and Figs. 5 and 9). '415 does not disclose a shrinking station in the region of which the large-surface front walls and rear walls of said packs are subjected to a shrinking process for the outer wrapper by means of surface heat transfer. However,

'662 discloses a similar process comprising a heat shrinkable station, used for the purpose wrapping tobacco.

Therefor, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified '415 process with a heat shrinkable station, as disclosed by '662, in order to assure the complete and strong wrapping to the articles. Alternatively, the examiner takes an official notice that the mentioned shrinkable station on the tobacco package manufacture is old, well known, and available in the art for the purpose of assuring of strong and complete package around the tobacco."

The Final Office Action asserts: "Regarding claim 48: '415 discloses a process for folding and sealing an outer wrapper on a dimensionally stable pack (3) comprising the following steps providing a wrapping film (via 8) for forming the outer wrapper; wrapping the wrapping film around the pack to form side tabs, bottom tabs, and top tabs (Fig. 1); causing the side tabs to overlap one another (Figs. 1, 5, and 9); thermally pre-sealing the side tabs (Figs. 1 and 3; via 49); causing the bottom tabs to overlap one another and the top tabs to overlap one another; thermally pre-sealing the overlapping bottom and side top tabs; permanently sealing the side tabs; and permanently sealing the bottom and top tabs (Figs. 2, 5, and 9; via sealing bars 32, 42, and 47). '415 does not disclose that the wrapping film is shrinkable. However, '662 discloses a similar process comprising a shrinkable wrapper used for the purpose wrapping tobacco.

Therefor, it would have been obvious to one having ordinary skill in the art at the time the invention was substituted '415's wrapper by having shrinkable wrapper, as taught by '662, in order to assure the complete and strong wrapping to the articles. Alternatively, the examiner takes an official notice that the mentioned shrinkable wrapper on the tobacco package manufacture is old,

well known, and available in the art for the purpose of assuring of strong and complete package around the tobacco."

The Second Advisory Action issued March 14, 2005 provides a different interpretation of Chinese patent '415, inconsistent with that of the Final Office Action. For example, the Second Advisory Action interprets Chinese patent '415 as disclosing "thermally pre-sealing the side tabs (Fig. 1; via the laser beams 53)", while the Final Office action states "the side tabs are permanently sealed in the region of their overlap by full-surface sealing (Figs. 1 and 3; via 53)". The same laser beam 53 does not serve to both pre-seal the side tabs and permanently seal the side tabs in this reference.

As shown below, none of the interpretations of Chinese patent '415 in any of the Actions support the rejection of pending claims 45-54.

VII. ARGUMENT

A. Case Law of 35 U.S.C. § 103(a)

The United States Patent and Trademark Office (USPTO) has the burden of showing a prima facie case of obviousness. *In re Bell*, 991 F.2d 781, 783 (Fed. Cir. 1993). In determining obviousness, the invention must be considered as a whole, and the claims must be considered in their entirety. *Medtronic, Inc. v. Cardiac Pacemakers, Inc.*, 721 F.2d 1563, 1567 (Fed. Cir. 1983). A prima facie case of obviousness is established when the teachings from the prior art itself would have suggested the claimed subject matter to a person of ordinary skill in the art. *In re Rhinehart*, 531 F.2d 1048, 1051 (CCPA 1976). More specifically, the requirements for establishing a prima facie case of obviousness include: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; (2) there must

be a reasonable expectation of success; and (3) the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The mere fact that the prior art could be modified would not have made the modification obvious unless the prior art suggested the desirability of the modification. *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984). The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicants' disclosure. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

"The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab,* 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). The notice of facts beyond the record which may be taken by the examiner must be "capable of such instant and unquestionable demonstration as to defy dispute" (citing *In re Knapp Monarch Co.*, 296 F.2d 230, 132 USPQ 6 (CCPA 1961)). It is never appropriate to rely solely on "common knowledge" in the art without evidentiary support in the record, as the principal evidence upon which a rejection was based. *Zurko*, 258 F.3d at 1385, 59 USPQ2d at 1697 ("[T]he Board cannot simply reach conclusions based on its own understanding or experience —or on its assessment of what would be basic knowledge or common sense. Rather, the Board must point to some concrete evidence in the record in support of these findings.").

Finally, obviousness may not be established using hindsight. *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1551 (Fed. Cir. 1983).

B. Analysis

1. Claim Group: Claims 45-54

Claims 45-54 are a part of one rejection. Claims 45 and 48 are the only independent claims pending. Claims 45 and 48 are believed patentable for the same reasons described in detail below. Appellants respectfully submit that the Final Office Action fails to establish a prima facie case of obviousness because the cited references when combined do not teach or suggest all the limitations of Claims 45 and 48. The cited references do not teach or suggest, for example, Applicants' two-step process for sealing the side tabs and the end wall and base wall tabs of an outer wrapper of a pack. The cited references do not teach or suggest, *inter alia*, connecting, or thermally pre-sealing, the tabs as a separate step prior to permanently sealing the tabs.

Claim 48 recites a process for folding and sealing an outer wrapper on a dimensionally stable pack which includes the steps of providing a shrink wrapping film for forming an outer wrapper, wrapping the shrink wrapping film around the pack to form side tabs, bottom tabs, and top taps, causing the side tabs to overlap (22) one another and thermally pre-sealing (27, 28, 41) the side tabs, causing (45, 46, 47) the bottom tabs to overlap one another and the top tabs to overlap one another and thermally pre-sealing (51, 52) the overlapping bottom and top tabs, permanently sealing (54) the side tabs, and permanently sealing (50, 55) the bottom and top tabs. Claim 48, thus, cites a two-step process in which the side tabs are first pre-sealed, the bottom and top tabs are pre-sealed, and then the side tabs permanently sealed and the bottom and top tabs permanently sealed.

Claim 45 describes a process for producing a pack made of thin cardboard with an outer wrapper made of thermally sealable and shrinkable material which includes providing a blank for

forming the outer wrapper and folding the blank around the pack in a tubular shape such that the side tabs (See Figs. 1 and 2, elements 20 and 21) of the outer wrapper overlap one another, then connecting (27, 28, 41, Fig. 6) the side tabs (20, 21, see Figs. 3, 4) to one another in the region of their overlap, thereafter folding (45, 46, 47, Fig. 6) the transverse (23, 24) and longitudinal (25, 26) folding tabs assigned to the end wall (18) and base wall (19) such that the transverse folding tabs and the longitudinal folding tabs partially overlap each other and then connecting (51, 52, Fig. 6) the transverse (23, 24) and longitudinal (25, 26) folding tabs to one another in the region of their overlap (see, Fig. 5). The process of Claim 45 next recites that the packs so wrapped are moved upward into a pack tower (49, Fig. 6) where the side tabs are permanently sealed (54, Fig. 6) in the region of their overlap by full surface sealing (illustrated as region 22 in Fig. 1), and thereafter transporting the pack laterally to a sealing path (50, Fig. 6) where the transverse and longitudinal folding tabs are surface sealed (Fig. 2). The sealing of the packs is then completed by conveying the packs through a shrinking station (56, Fig. 6) where the large-surface front walls and rear walls of the packs are subjected to a shrinking process by means of surface heat transfer (57, 58, 59, Fig. 6).

Claims 45 and 48, thus, recite a process in which the side tabs of a wrapper are sealed not once but twice and also the top and bottom tabs (as recited in Claim 45), alternatively the transverse and longitudinal folding tabs (as recited in Claim 45), are sealed twice. Additionally, the second (permanent) sealing of the side tabs in the region of their overlap presented by element (22) in Applicants' figures occurs after the top and bottom tabs of Claim 48 are first thermally pre-sealed, and in the case of Claim 45 after the transverse and longitudinal folding tabs are first connected in the region of their overlap. The second (permanent) sealing of the side tabs in the region of their overlap (22), thus, occurs only in the region illustrated in, for example

Fig. 1, which is in the region of the overlap of the side tabs between end wall (18) and base wall (19) of the pack.

In contrast, the Chinese '415 patent as represented by its U.S. counterpart 5,701,725 (Appendix C), teaches only a single sealing step for the side tabs and a single sealing step for its top and bottom tabs. More particularly, Fig. 1 of the U.S. '725 patent illustrates the sealing of the side tabs, 22 and 23 of wrapper 34, and top and bottom longitudinal tabs, 24 and 25, as well as transverse tabs 35. Transverse tabs 35 are defined as the portion of the side tabs which extend laterally and project beyond the top and bottom end walls of the pack (Col. 4, lines 57-58). Fig. 1 illustrates that the side tabs 22 and 23, that exclude transverse tabs 35, are sealed only once in the method and system of the U.S. '725 patent. This is illustrated by a broken line 56 and occurs at station 49. These elements are highlighted in yellow in Fig. 1 of the '725 patent, Appendix C. More particularly, U.S. '725 patent states: "Device 48 comprises a laser source 52 for emitting a laser beam 53, which is preferably only partly focused, by a reflecting and focusing device 54 and through a slit 55 formed in plate 32 parallel to axis 15, onto a sealing strip 56 extending along portion 22 and facing slit 55." (Col. 4, lines 7-11). The laser beam 53 is swept along strip 56 to seal portions 22 and 23 of wrapper 34. (Col. 4, lines 16-17). Sealing strip 56 specifically excludes laterally projecting transverse tab portions 35. Thus, Fig. 1 and the text of the U.S. '725 patent make clear that the side tabs 22 and 23 are sealed only once along sealing strip 56 and that the laterally projecting tab portions 35 are not sealed by the laser beam 53 of device 48.

Fig. 1 of the U.S. '725 patent teaches that the pack is then moved to a second sealing station where the bottom end tabs 24 and 25 are sealed by laser sealing device 50 (Col. 4, lines 18-29). These elements are highlighted in blue in Fig. 1 of the '725 patent, Appendix C. Figs. 5 and 6 illustrate a device 71 which serves to fold laterally projecting tabs 35 simultaneously with

longitudinal top and bottom tabs 24 and 25. Alternatively, Figs. 3 and 4 illustrate the sealing of side tabs 22 and 23 along sealing strip 56 by one laser device 48 and laterally projecting tabs 35 and top and bottom longitudinal tabs 24 and 25 simultaneously by way of a second laser device 78 at the same sealing station.

Thus, U.S. '725 makes it clear that the side tabs along sealing strip 56, between the top and bottom end walls of the pack, are sealed only once, and the top and bottom longitudinal tabs along with laterally projecting tabs 35 are sealed only once. The problem addressed by this reference is avoiding the danger of burning, i.e. severing, the wrapper where it is sealed. See Col. 1, lines 39-41 and Col. 4, lines 42-44. This burning problem addressed by the U.S. '725 reference teaches away from the second sealing of the same tabs carried out by Applicants' process. This is a different problem than the above-described problem addressed and solved by Applicants' process, namely undesired shrinkage of the outer wrapper before the folding tabs are completely and permanently sealed.

The references relied upon for the rejection of the pending claims, including independent Claims 45 and 48, thus do not teach all of the steps recited in Applicants' claims. More particularly, the side tabs (20, 21) in their region of overlap (22) of Applicants' wrapper are connected or pre-sealed in a first step and subsequently sealed a second time, permanently, in a second step. Similarly, the longitudinal folding tabs (24, 25), also referred to as top and bottom tabs, are connected or pre-sealed in a first step after being folded over end wall (18) and base wall (19) and subsequently sealed a second time, permanently, in a separate step. The second, permanent sealing of the side tabs (20, 21) occurs after the longitudinal tabs (24, 25) and transverse tabs (23, 24) are folded about the end wall (18) and base wall (19) of the pack and connected/pre-sealed, thus limiting the second sealing of side tabs (20, 21) to the region of their

overlap illustrated as region (22) between the end wall (18) and the base wall (19) in Fig. 1. This process as recited in Applicants' claims is not taught or suggested by any of the cited references.

Since the cited references do not teach or suggest every step of the process recited in Claims 45 or 48, they do not support the present rejection of the claims. The region of overlap (22) of Applicants' side tabs (20, 21) that is sealed twice is analogous to the region of sealing strip 56 of the Chinese '415 reference that is sealed only once. Applicants' transverse tabs (23, 24) that project beyond and are folded about the end wall (18) and base wall (19) are analogous to laterally projecting tabs 35 of the Chinese reference. Tabs 35 of the Chinese reference that are outside of the region of sealing strip 56 are sealed in conjunction with end portions 24, 25 only once by either device 50 (Fig. 1) or device 78 (Figs. 3,4). Likewise, Applicants' longitudinal end tabs (24, 25) that are sealed twice are analogous to end portions 24 and 25 of the Chinese reference that are sealed only once. Moreover, since the tabs of the Chinese reference are sealed only once, the Chinese reference does not teach or suggest the order of Applicants' sealing process by which Applicants' side tabs, and longitudinal and transverse tabs, are connected/pre-sealed before any of the sets of tabs is permanently sealed.

Additionally, the cited references do not teach or suggest steps (e) and (f) of claim 45. In particular, the Chinese reference does not teach moving the packs upwardly into a pack tower where the side tabs are permanently sealed. Fig. 1 of the Chinese reference shows the sealing of all of the tabs occurs prior to arrow 46 representing upward movement of the sealed packs into a pack tower. And the Chinese reference does not teach or suggest full surface sealing of the side tabs in the region of their overlap recited in step (e) and illustrated in Fig. 1. Nor does the Chinese reference teach or suggest transporting the pack laterally after it has moved upwardly

into the pack tower to a sealing path where the transverse and longitudinal folding tabs are surface sealed, again since all tabs are sealed prior to transport upwardly into a pack tower.

The Final Office Action contains inherent inconsistencies in its interpretation of this reference that do not support the rejections. At the bottom of page 2 and continuing on page 3, the Office Action states "next moving the packs upward into a pack tower, where the side tabs are permanently sealed in the region of their overlap by full-surface sealing (Figs. 2 and 3; via 53)". This statement is incorrect in that, as seen in Fig. 1, the sealing by the sealing station 49, by way of laser beam 53, does not occur in the pack tower. Moreover, the sealing does not produce full-surface sealing, as discussed above. Further, this statement in the Office Action is inconsistent with the statement at the bottom of page 3 that the Chinese reference discloses "thermally pre-sealing the side tabs (Figs. 1 and 3; via 49)". Element 49 is identified in the U.S. '725 patent as a sealing station (See Col. 4, line 2 of the U.S. '725 patent). The sealing station 49 includes a laser sealing device 48 that comprises a laser source that emits laser beam 53. (See Col. 4, lines 2-8). Thus, the laser beam, element 53 is a part of the sealing station 49. Since elements 49 and 53 are part of the same device, they do not produce both pre-sealing and permanently sealing of the side tabs. The Office Action at page 4 refers to "sealing bars 32, 42, and 47". Applicants respectfully submit that this is a further misinterpretation of the reference. Elements 32, 42 and 47 are not disclosed in the U.S. '725 patent as providing any sealing function. Instead, element 32 is referred to as a "positioning plate". See Col. 3, line 39. Element 42 is referred to as an "unloading device" (Col. 3, line 59), and element 47 is referred to as "an assembly". For example, positioning plate 32 has a function solely of folding and holding tabs 35 in place pending permanent sealing by the sealing device. No sealing or connecting of the

tabs is provided by folding plate 32. See, for example, Col. 3, lines 29-42 of the U.S. '725 patent.

The comments in the Final Office Action are not aided by either of the subsequent Advisory Actions. The First Advisory Action (Paper No. 11292004) comments the "examiner believes that the Chinese patent '415 disclose the pre-sealing step (Fig. 1, via station 49 and laser beam 53) and the permanently sealing (Fig. 1, via station 10 by arrow 6 and 46) to finish the pre-sealing step." Station 49, however, seals one set of tabs (22, 23), while station 10 seals a different set of tabs (24, 25, 26, 35). Thus, this citation does not teach or suggest Applicants' claimed two-step process. This citation does not teach or suggest pre-sealing followed by permanently sealing the same set of tabs.

The Second Advisory Action (Paper No. 03092005) comments "the examiner still believes that the applied reference '415 or the English equivalent 5,701,725 discloses the claimed thermally pre-sealing the side tabs (Fig. 1; via the laser beams 53) and thermally pre-sealing bottom and top tabs (Fig. 1; via compressing U-shaped pocket 43), it is inherent by compressing on the folded top and bottom tabs will cause some energy, which considered as thermally pre-sealing top and bottom tabs; permanently sealing the side tabs (Fig. 1; via by folding the top and bottom tabs will cause in finishing the free end portions of the side seal to be folded along with the bottom and top tabs); and permanently sealing the bottom and top tabs (Fig. 1; via laser source 50)." Laser beam 53, however, does not pre-seal the side tabs in Chinese patent '415. Laser beam 53 serves as the one and only sealing of the side tabs. The compressing U-shaped pocket 43 does not serve to thermally pre-seal the top and bottom tabs. Merely compressing the tabs does not serve to thermally pre-seal or connect the tabs. Moreover, claims 45 and 48 recite both sealing or connecting a given set of tabs in addition to folding, or causing them to overlap which is not met by this citation.

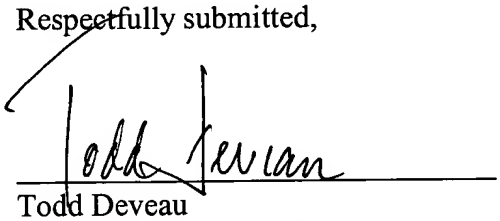
The combination of the two cited references fails to teach or suggest all of the steps recited in claims 45 and 48. The secondary reference, WO 9856662 A , is presented only for a showing of a shrinkable wrapper used for the purpose of wrapping tobacco. It, too, fails to teach or suggest Applicants' claimed two-step process.

Thus, Applicants respectfully submit claims 45 and 48 are allowable over the cited references. Claims 46-47 and 49-54 being dependent upon claims 45 and 48, respectively, are believed allowable for the same reasons as their independent base claims.

VIII. CONCLUSION

Based upon the foregoing discussion, Applicants respectfully request that the final rejection of Claims 45-54 be overruled and withdrawn by the Board and that the application be allowed to issue as a patent with pending Claims 45-54. Any additional fee that may be due or required is authorized to be charged to our Deposit Account No. 20-0778.

Respectfully submitted,



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A. CLAIMS APPENDIX

All pending claims as amended.

45. (Previously Amended) Process for producing a pack made of thin cardboard with an outer wrapper made of thermally sealable and shrinkable material having folding tabs, including side tabs, and transverse folding tabs and longitudinal folding tabs assigned to an end wall and a base wall of the pack, the outer wrapper enclosing the pack and the folding tabs thereof being connected to one another in the region of overlaps by thermal sealing, comprising the steps of:

(a) providing a blank for forming the outer wrapper and folding said blank around the pack in a tubular shape such that the side tabs of the outer wrapper overlap one another,

(b) then connecting the side tabs to one another in the region of the overlap,

(c) thereafter folding the transverse and longitudinal folding tabs assigned to the end wall and the base wall such that the transverse folding tabs and the longitudinal folding tabs partially overlap each other,

(d) then connecting the transverse and longitudinal folding tabs to one another in the region of their overlap,

(e) next moving the packs upward into a pack tower, where the side tabs are permanently sealed in the region of their overlap by full-surface sealing,

(f) thereafter transporting the pack laterally to a sealing path where the transverse and longitudinal folding tabs are surface sealed, and

(g) the packs with the finished and sealed outer wrapper are then conveyed through a shrinking station, in the region of which the large-surface front walls and rear walls of said packs are subjected to a shrinking process for the outer wrapper by means of surface heat transfer.

46. (Previously amended) The process of Claim 45, wherein the connecting step (b) involves spot seals.

47. (Previously amended) The process of Claim 45, wherein the connecting steps do not initiate shrink wrapping.

48. (Previously amended) A process for folding and sealing an outer wrapper on a dimensionally stable pack comprising the following steps:

providing a shrink wrapping film for forming the outer wrapper;

wrapping the shrink wrapping film around the pack to form side tabs, bottom tabs, and top tabs;

causing the side tabs to overlap one another;

thermally pre-sealing the side tabs;

causing the bottom tabs to overlap one another and the top tabs to overlap one another;

thermally pre-sealing the overlapping bottom and top tabs;

permanently sealing the side tabs; and

permanently sealing the bottom and top tabs.

49. (Previously added) The method of claim 48, wherein the pre-sealing steps and the permanent sealing steps do not initiate shrink wrapping of the film.

50. (Previously added) The method of claim 48, furthering comprising the step of shrinking the film, after the side tabs and the bottom and top tabs are permanently sealed, by heating.

51. (Previously added) The method of claim 48, wherein pre-sealing any of the overlapping tabs covers less than half of the area of overlap of the tabs.

52. (Previously added) The process of claim 45, wherein the connecting step (b) involves tacking.

53. (Previously added) The process of claim 45, wherein the connecting step (b) involves a narrow interrupted sealing strip.

54. (Previously added) The process of claim 45, wherein the connecting step (b) involves a narrow continuous sealing strip.

PROCESS FOR PRODUCING HINGE-LID BOXES FOR CIGARETTES

Field of the Invention

The invention relates to a process for producing (dimensionally stable) packs made of (thin) cardboard with an outer wrapper made of thin film, in particular a hinge-lid box for cigarettes. The invention also relates to an apparatus for producing such packs and/or for carrying out the process.

Background of the Invention

It is common in packaging technology to provide dimensionally stable packs, consisting in particular of cardboard, with an outer wrapper made of thin, transparent film. Such an outer wrapper is common in cigarette packs of the hinge-lid type. Before the pack is opened for the first time, the outer wrapper, which is usually provided with a tear-open strip, is removed.

Summary of the Invention

The invention concerns measures for the improved production of such packs, in particular hinge-lid packs for cigarettes. The object of the invention is to ensure an improved, particularly fold-free, appearance of the outer wrapper by virtue of the film being shrunk.

In order to achieve this object, the process according to the invention is characterized by the following features:

a) the outer wrapper consists of a shrink-wrapping film,

b) the pack provided with the outer wrapper is subjected to a shrink wrapping and/or heat treatment,

c) prior to the shrink-wrapping treatment, folding tabs of the outer wrapper are connected to one another by large-surface-area heat sealing, and, prior to the heat sealing operation, the folding tabs are (temporarily) fixed in their folding position by tacking.

The invention is based on the finding that, upon initiation of the shrink-wrapping and/or heat treatment, the outer wrapper has to be completely finished; in other words all the folding tabs have to be folded into the correct position and fixed in said position. In order to connect the folding tabs to one another, particularly in the region of the end wall, base wall and side wall, use is made of large-surface-area sealing elements which subject the folding tabs to the action of heat, usually over a large surface area and/or over the entire surface area of the pack, in order to bring about heat sealing of the folding tabs. The shrink-wrapping process of the outer wrapper is initiated in this case. This results, in particular, with sealing steps which follow one after the other in time of space, in undesired, permanent deformations of the outer wrapper. In the invention, as a result of the preliminary sealing and/or preliminary tacking, fixing of the outer wrapper in the correct folding position is completed without a shrink-wrapping treatment being initiated by said tacking and/or preliminary sealing. It is then possible for the pack to be subjected directly to a shrink-wrapping treatment or to be sealed over a large surface area in the region of the folding tabs in the conventional manner.

The apparatus according to the invention, as part of a packing machine, is designed such that tacking elements are arranged upstream of a sealing station and/or sealing subassemblies, for the folding tabs, which tacking elements bring about tacking and/or preliminary sealing of the folded outer wrapper in the region of the folding tabs.

Brief Description of the Drawings

Further details of the invention are explained in more detail below with reference to exemplary embodiments of the pack according to the invention and of an apparatus. In the drawings:

Figure 1 shows a pack, namely a hinge-lid box with ready sealed side tabs,

Figure 2 shows the hinge-lid box according to Figure 1 with ready sealed end tabs and base tabs,

Figure 3 shows the pack with partially folded outer wrapper and tacked side tabs,

Figure 4 shows an illustration corresponding to Figure 3 with likewise tacked side tabs,

Figure 5 shows the pack according to Figure 3 with tacked end tabs and base tabs,

Figure 6 shows a schematic side view of an apparatus for producing and/or sealing and shrink-wrapping an outer wrapper of a pack,

Figure 7 shows a detail of the apparatus according to Figure 6, namely a section along section plane VII-VII of a folding turret,

Figure 8 shows a view of a detail of the apparatus according to Figure 6 in accordance with arrow VIII.

Detailed Description of a Preferred Embodiment

The drawings concern a cubical pack 10 of the hinge-lid-box type for cigarettes. The pack 10 comprises a blank of thin cardboard. In accordance with the conventional construction, the pack comprises a box part 11 and a lid 12.

The pack 10 is enclosed by an outer wrapper 13 made of thin film, to be precise a shrink-wrapping film. The outer wrapper 13 forms, in accordance with the configuration of the pack 10, large-surface-area walls, namely a front wall 14 and rear wall 15, narrow, elongate side walls 16 and 17 and an end wall 18 and base wall 19.

The outer wrapper 13 forms folding tabs which are connected to one another by heat sealing. In the region of the side wall 16, side tabs 20 and 21 of the blank of the outer wrapper 13 form a strip-like overlap 22. The latter extends over the entire length of the outer wrapper 13 (Figures 3 and 4). The side tabs 20, 21 are connected to one another by sealing in the region of the overlap 22, to be precise over the entire surface area of the overlap 22, as is illustrated in Figure 1 by the blackened sealing surface areas.

The end wall 18 and base wall 19 likewise comprise folding tabs, to be precise inner transverse tabs 23, 24 and outer, trapezoidal longitudinal tabs 25, 26. The tabs 23, 24, 25, 26 partially overlap one another. In Figure 2, the overlap region, and thus the region of

the tabs 23, 24, 25, 26 which are connected to one another by sealing, is illustrated as a blackened and/or hatched surface area.

Providing the large-surface-area seals in the area of the overlap 22 and of the base wall 19 brings about at least the initiation of the shrink-wrapping process as far as the outer wrapper 13 is concerned. This is disadvantageous, in particular, when the operations of sealing the overlap 22, on the one hand, and sealing the end wall 18 and base wall 19, on the other hand, are carried out in successive steps.

In order to ensure a precise form and position of the outer wrapper 13 despite successive sealing steps, the folding tabs are connected to one another by tacking in preceding steps, the operation of providing the tacking being associated with a small and/or locally limited supply of heat.

First of all, on account of the sequence of folding steps, tacking is provided in the region of the overlap 22 of the side tabs 20, 21. In the exemplary embodiment of Figure 3, said tacking comprises small-surface-area spot seals 27. A plurality of circular or oval spot seals 27 are provided along the (non-folded) overlap 22 in a spaced apart manner. At least in each case one spot seal 27 is located in the region of those regions of the outer wrapper which project beyond the pack 10 and are intended for forming the transverse tabs 23.

An alternative is shown in Figure 4 by a sealing strip 28 which extends over the entire length of the blank and/or of the (non-folded) overlap 22. Said sealing strip is of comparatively narrow width, for example approximately 2 mm. This gives a connection between the side tabs 20, 21 which is sufficient for the rest of the folding process, without the shrink-wrapping process for the outer wrapper 13 being initiated as a result of the supply of heat.

Thereafter, folding of those parts of the outer wrapper which project beyond the pack 10 is completed, the end wall 18 and base wall 19 being formed in the process. In order to fix the folding tabs 23, 24, 25, 26, likewise small-surface-area tacking connections

produced by heat sealing, namely in each case two tacking strips 29, 30, are provided. These are provided such that all the folding tabs of the end wall 18 and base wall 19 are covered, that is to say are connected to one another locally. This is because the tacking strips 29, 30 are located in a region in which transverse tabs 23 or 24 and the two longitudinal tabs 25, 26 overlap one another in each case.

Following the tacking of the folding tabs 20, 21 and/or 23, 24, 25, 26, said regions are sealed in a conventional manner. This brings about, at the same time, shrinkage of the film of the outer wrapper 13. It is additionally possible, however, for the pack 10 to be subjected to a separate shrink-wrapping process.

The operation of providing the tacking connections on the outer wrapper 13 is expediently integrated in the production process of the outer wrapper 13. The apparatus according to Figure 6 is expediently part of a production line for cigarette packs.

The packs 10, which, with the exception of the outer wrapper 13, have been finished, are supplied on a horizontal pack path 31. The packs 10, which are spaced apart from one another as they arrive, run through a blank unit 32. The latter severs blanks of the outer wrapper 13 from a continuous material web 33. The blanks are held ready in an upright plane, transversely to the pack path 31, by an upright blank conveyor 34, such that the blank of the outer wrapper 13 is folded in the form of a U around the pack 10 conveyed along the pack path 31.

The pack 10 is transferred with the outer wrapper 13 to a folding turret 35. The latter is provided with a plurality of pockets 36, each for receiving one pack 10 with outer wrapper 13, in the present case eight pockets 36 of which in each case two are located in a horizontally directed receiving position and push-out position. The pockets 36 are directed radially and are open on the outside.

When the pack 10 with outer wrapper 13 folded in the form of a U is pushed in, the transverse tabs 24 projecting on both sides of the pack are folded, to be precise, by fixed folding fingers 37 arranged in or on each pocket 36.

By virtue of cyclic rotary movement of the folding turret 35, the packs 10 are conveyed into a first tacking station 38 and then into a second tacking station 39. The first tacking station 38 corresponds to a vertical position of the relevant pocket 36. Upon reaching said first tacking station 38, the side tabs 20, 21 of the outer wrapper 13 have already been folded into a position according to Figures 3 and 4. During the standstill phase, in the tacking station 38, a heated tacking element 40 is moved onto the radially outwardly directed side wall 16 of the pack 10. In this case, sealing tools 41 come into abutment against the side tabs 20, 21, to be precise in the region of the overlap 22. The sealing tools 41 are designed in accordance with the tacking which is to be produced, for example as individual protrusions for spot tacking according to Figure 3 or as a thin, continuous sealing jaw for the exemplary embodiment according to Figure 4. The tacking element 40 is mounted pivotably on a carrying arm 42.

In the next-following station, the second tacking station 39, the tacking of the side tabs 20, 21 is completed by a correspondingly designed tacking element 43. Two tacking elements and two tacking stations 38, 39 are necessary in particular with short standstill periods of the folding turret 35.

The pack with outer wrapper 13 designed in accordance with Figure 3 or 4 is pushed radially out of the folding turret 35, and into a folding path 45, in the region of a push-out station 44. In the region of said horizontal folding path 45, those parts of the outer wrapper 13 which project on both sides in the region of the end wall 18 and base wall 19 are folded, that is to say first of all, during the push-out operation, the transverse tab 23 is folded by a fixed folding finger 46 and then the two longitudinal tabs 25 and 26 are folded by corresponding folding elements 47, so-called folding diverters.

Following the folding path 45, the pack 10, with the outer wrapper 14 in the completely folded state, passes onto a platform 48. Form here, the packs 10 are raised cyclically, forming a pack tower 49 in the process, into the region of a horizontal sealing path 50 located at a correspondingly higher level.

Following the folding path 45, namely on the platform 48, the folds of the end wall 18 and base wall 19 are tacked. In order to provide the tacking connections, namely the tacking strips 29, 30, tacking elements 51, 52 are arranged on both sides of the folding path 45 and/or the platform 48, and each have two spaced-apart tacking jaws 52 corresponding to the form of the tacking strips 29, 30. The tacking elements 51, 52 are moved against the end wall 18 and base wall 19 during the standstill phase of the pack 10.

The pack 10, with the outer wrapper 13 now in the completely tacked state, is subjected to a sealing operation in the conventional manner. In this case, first of all sealing of the side tabs 20, 21 is completed by a sealing tool 54, which extends vertically over a plurality of , namely three, packs 10 and seals the side tabs 20, 21 during three standstill phases of the packs 10 in the region of the pack tower 49.

Thereafter, the packs 10 are pushed off transversely into the sealing path 50. Within the latter, the packs 10 are positioned in two rows arranged one above the other. Sealing of the sideways directed end walls 18 and base walls 19 is completed here by sealing jaws 55, likewise during the respective standstill phases of the packs 10 in a number of sealing cycles.

During the sealing of the side tabs 20, 21 and/or of the end walls 18 and base walls 19 in steps which follow one after the other in time, it is possible for the shrink-wrapping operation of the outer wrapper 13 to be initiated or carried out in full. In the exemplary embodiment shown, the packs 10 are conveyed through a separate shrink-wrapping station 56 following the sealing of the outer wrapper 13. In the region of said shrink-wrapping station 56, the packs 10 are subjected to the action of heat in the region of the

front wall 14 and/or rear wall 15. For this purpose, heating plates 57, 58, 59 are arranged above, beneath and between the rows of packs 10, said heating plates transmitting the shrink-wrapping heat to the pack 10.

The tacking and sealing temperatures may correspond to one another. A sealing temperature of approximately 145° C is suitable for tacking the folding tabs 20, 21, 23, 24, 25, 26.

Once it has left the shrink-wrapping station 56, the pack 10 is processed further in a conventional manner.

The above principle of tacking folding tabs of the outer wrapper 13 before the operation of sealing the same may also be advantageous when shrink-wrapping film is not used.

We Claim:

45. Process for producing a pack made of thin cardboard –with an outer wrapper made of thermally sealable and shrinkable material having folding tabs, including side tabs, and transverse folding tabs and longitudinal folding tabs assigned to an end wall and a base wall of the pack, the outer wrapper enclosing the pack and the folding tabs thereof being connected to one another in the region of overlaps by thermal sealing, comprising the steps of:

(a) providing a blank for forming the outer wrapper and folding said blank around the pack in a tubular shape such that the side tabs of the outer wrapper overlap one another,

(b) then connecting the side tabs to one another in the region of the overlap,

(c) thereafter folding the transverse and longitudinal folding tabs assigned to the end wall and the base wall such that the transverse folding tabs and the longitudinal folding tabs partially overlap each other,

(d) then connecting the transverse and longitudinal folding tabs to one another in the region of their overlap,

(e) next moving the packs upward into a pack tower, where the side tabs are permanently sealed in the region of their overlap by full-surface sealing,

(f) thereafter transporting the pack laterally to a sealing path where the transverse and longitudinal folding tabs are surface sealed, and

(g) the packs with the finished and sealed outer wrapper are then conveyed through a shrinking station, in the region of which the large-surface front walls and rear walls of said packs are subjected to a shrinking process for the outer wrapper by means of surface heat transfer.

46. The process of Claim 45, wherein the connecting step (b) involves spot seals.

47. The process of Claim 45, wherein the connecting steps do not initiate shrink wrapping.

48. A process for folding and sealing an outer wrapper on a dimensionally stable pack comprising the following steps:

providing a shrink wrapping film for forming the outer wrapper;

wrapping the shrink wrapping film around the pack to form side tabs, bottom tabs, and top tabs;

causing the side tabs to overlap one another;

thermally pre-sealing the side tabs;

causing the bottom tabs to overlap one another and the top tabs to overlap one another;

thermally pre-sealing the overlapping bottom and top tabs;

permanently sealing the side tabs; and

permanently sealing the bottom and top tabs.

49. The method of claim 48, wherein the pre-sealing steps and the permanent sealing steps do not initiate shrink wrapping of the film.

50. The method of claim 48, furthering comprising the step of shrinking the film, after the side tabs and the bottom and top tabs are permanently sealed, by heating.

51. The method of claim 48, wherein pre-sealing any of the overlapping tabs covers less than half of the area of overlap of the tabs.

52. The process of claim 45, wherein the connecting step (b) involves tacking.

53. The process of claim 45, wherein the connecting step (b) involves a narrow interrupted sealing strip.

54. The process of claim 45, wherein the connecting step (b) involves a narrow continuous sealing strip.

US005701725A

United States Patent [19]

Neri et al.

[11] Patent Number: 5,701,725

[45] Date of Patent: Dec. 30, 1997

[54] **METHOD AND MACHINE FOR PRODUCING WRAPPINGS FOR PRODUCTS**

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[21] Appl. No.: **688,767**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[6] **B65B 11/40**; B65B 19/22; B65B 51/10; B23K 26/00

[52] **U.S. Cl.** **53/466**; 53/234; 53/375.9; 53/376.2; 53/416; 219/121.63; 219/121.64

[58] **Field of Search** 53/466, 461, 416, 53/375.9, 376.2, 373.8, 370.8, 377.8, 234, 228, 232, 230; 219/121.64, 121.63

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[57] **ABSTRACT**

A wrapping method and machine for producing wrappings for products, whereby a sheet of wrapping material is folded about a respective product so that at least a first and a second portion of the sheet of wrapping material are superimposed one on top of the other, with the first portion outside the second; and the two portions are sealed to each other by compressing the two portions onto each other, and sweeping at least one laser beam along a sealing portion of the first portion.

38 Claims, 5 Drawing Sheets

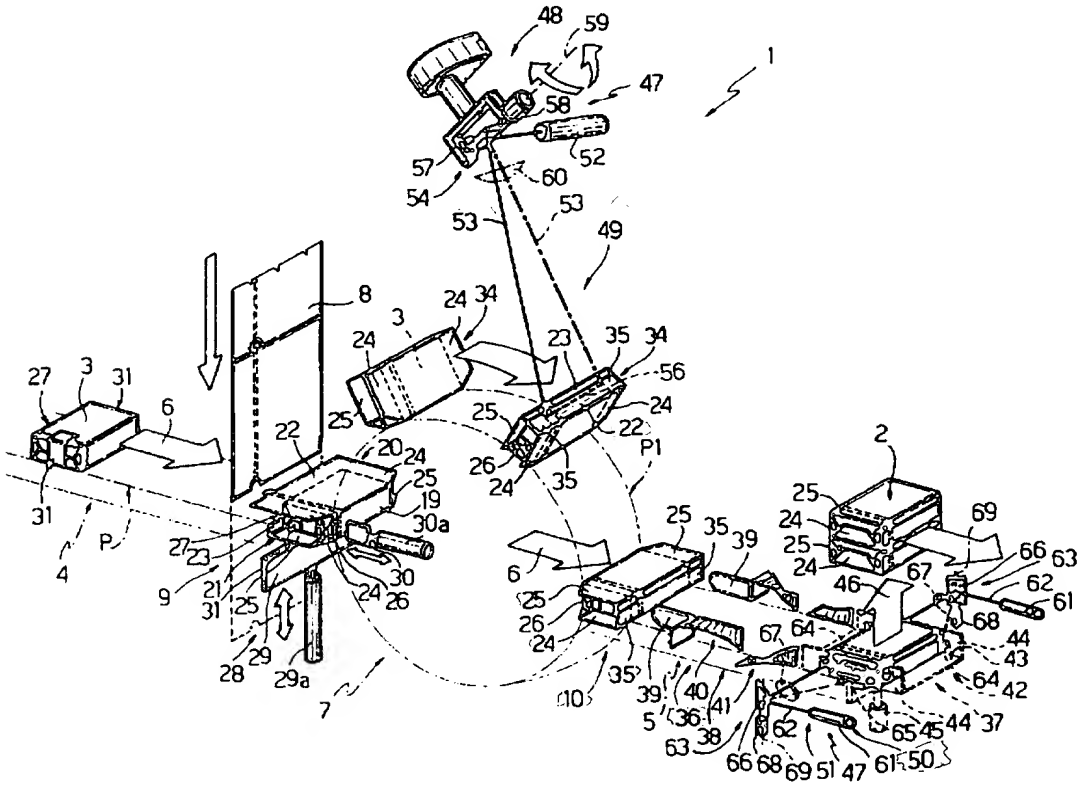
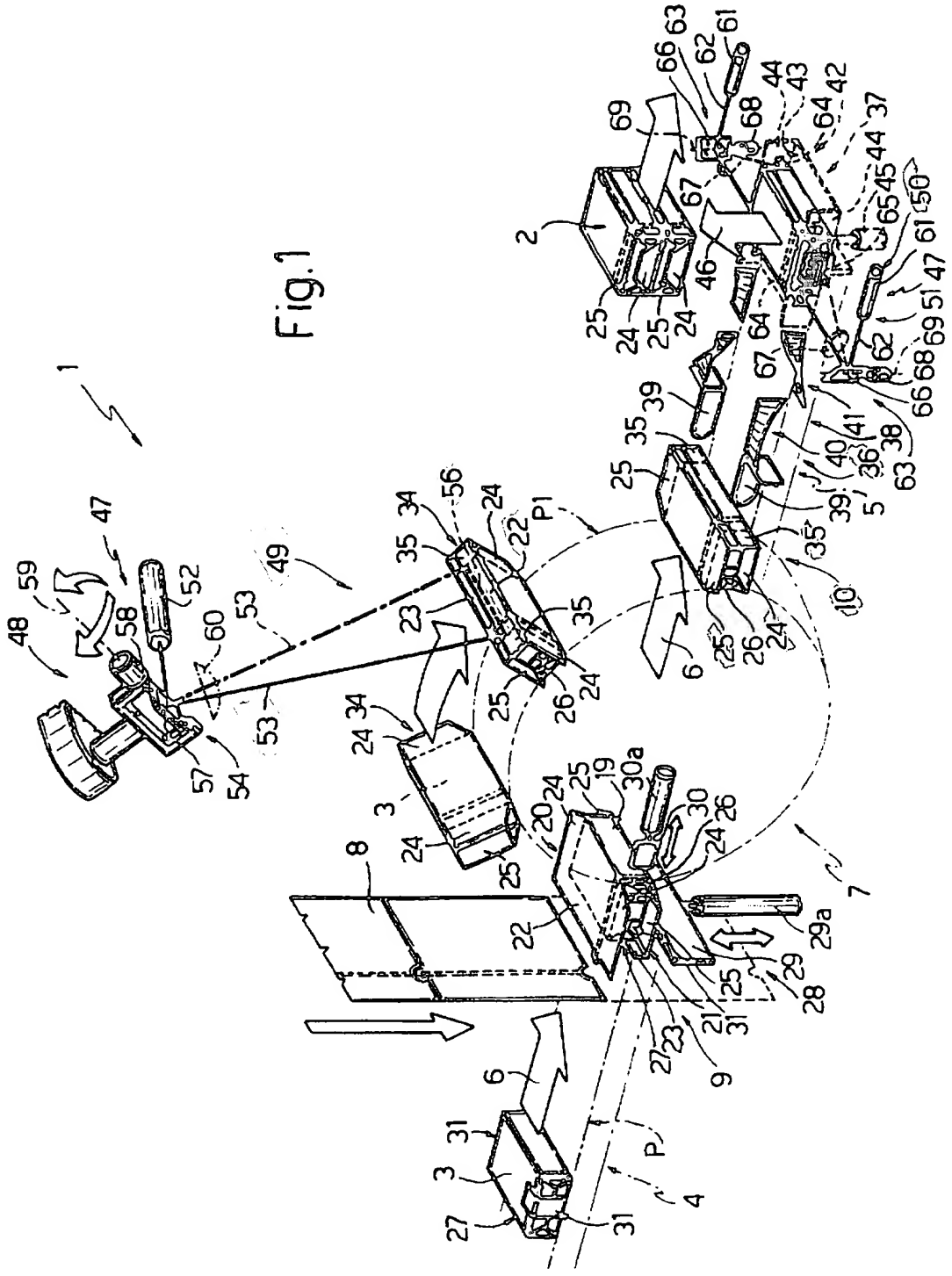


Fig. 1



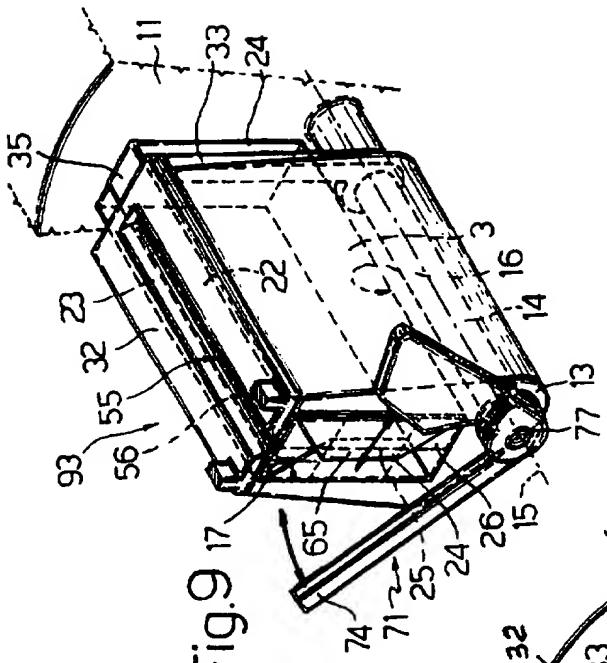


Fig.9

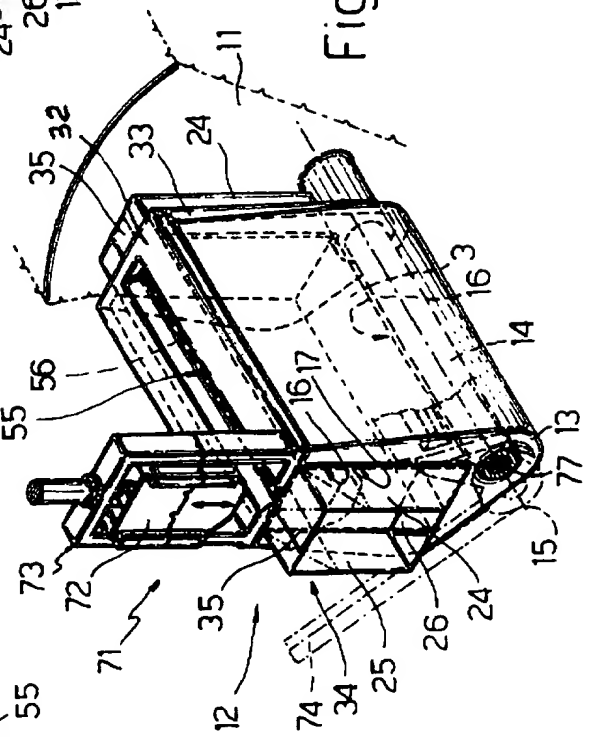


Fig.5

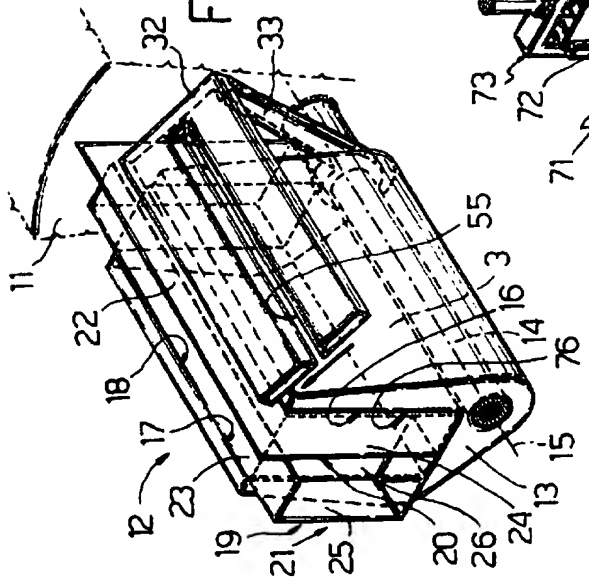


Fig.2

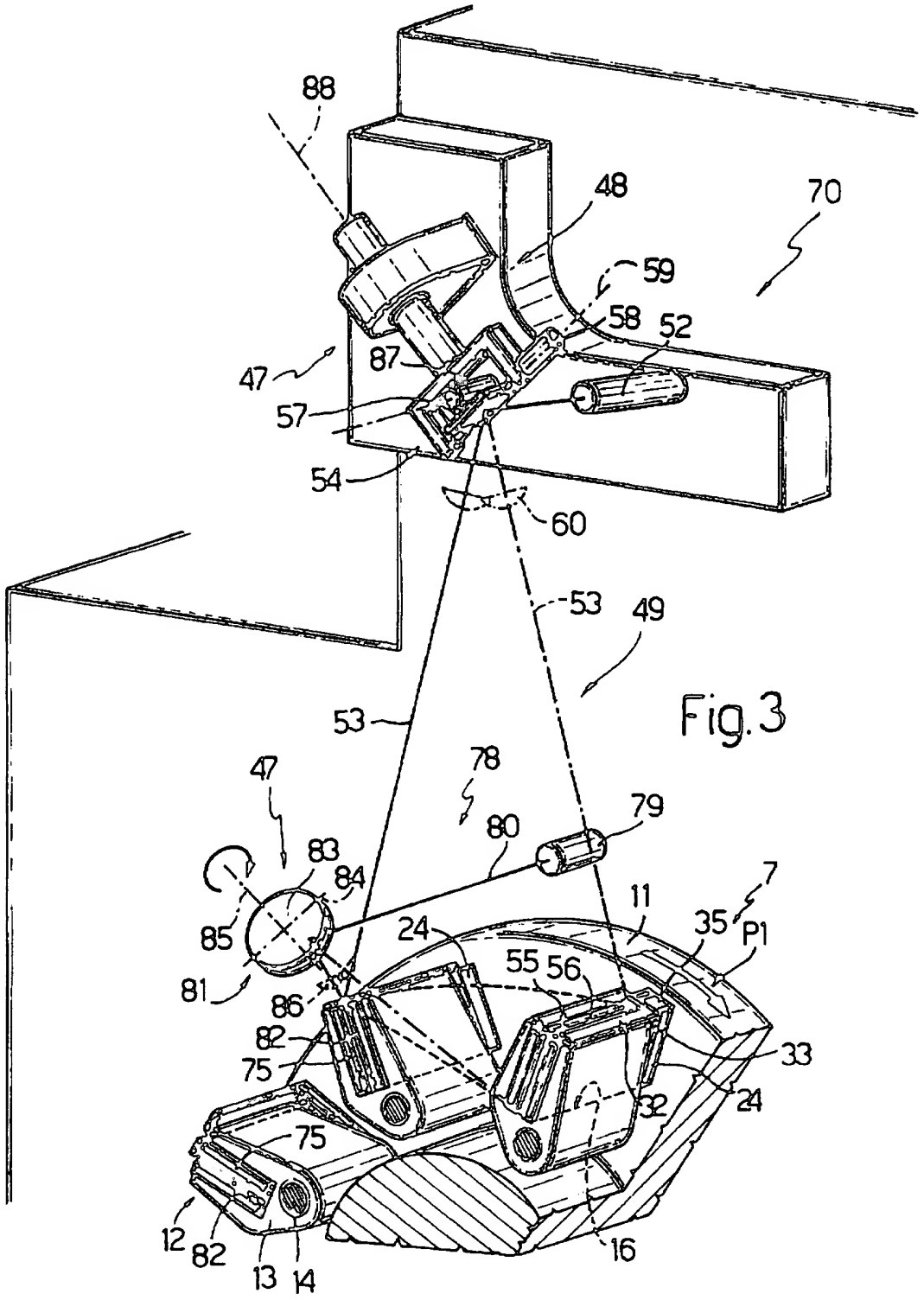

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Fig. 3

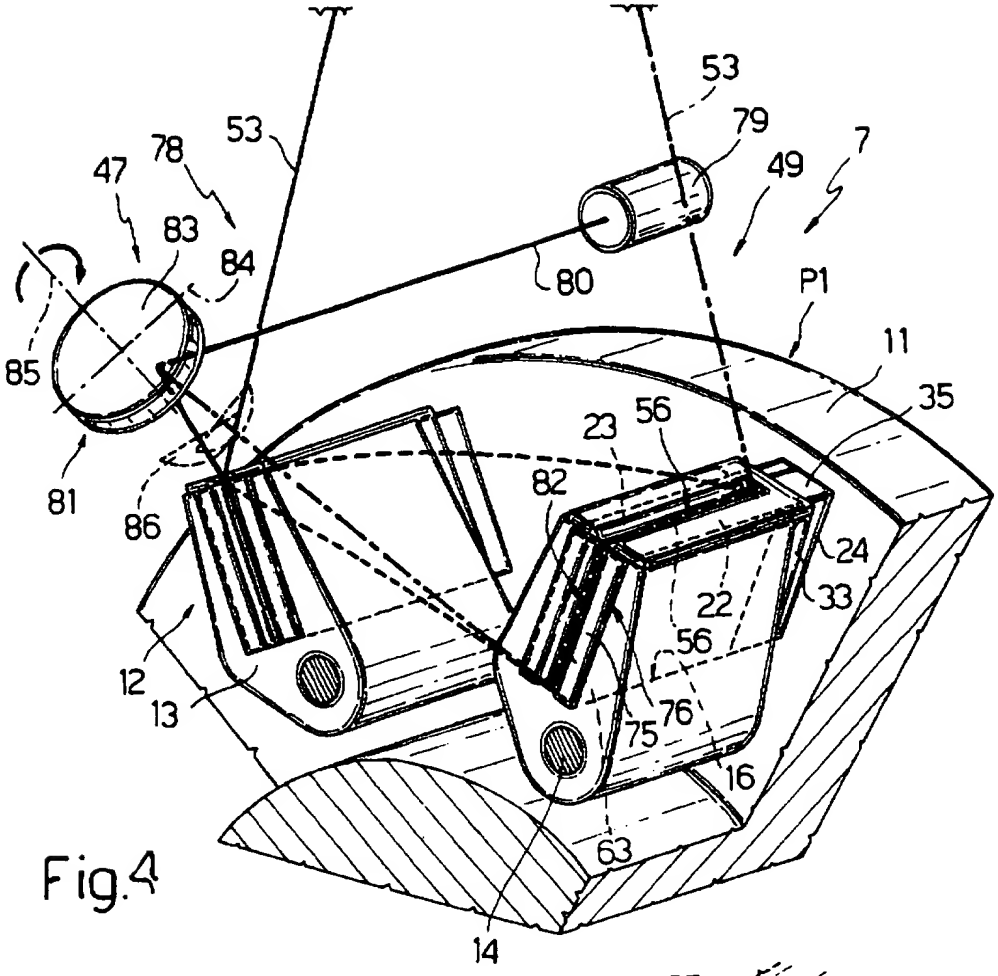
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Fig.4

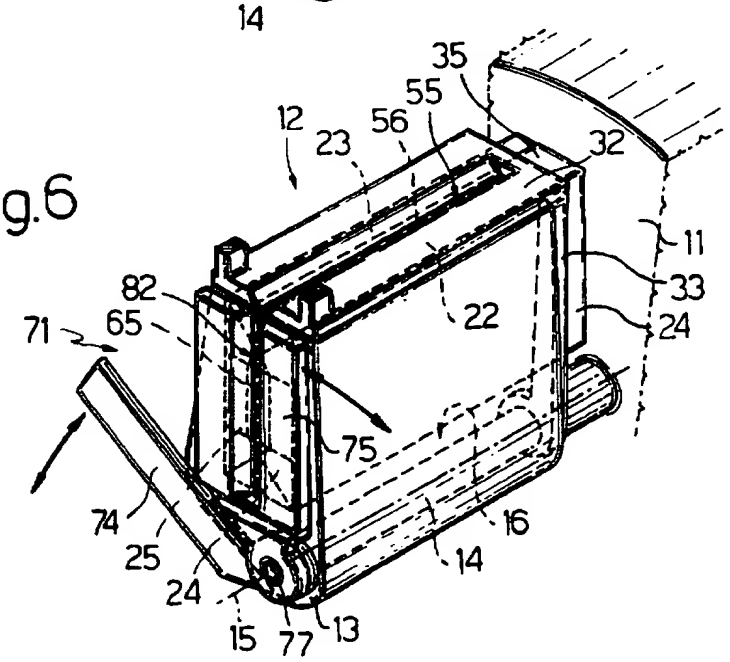
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Fig.6

Fig. 7

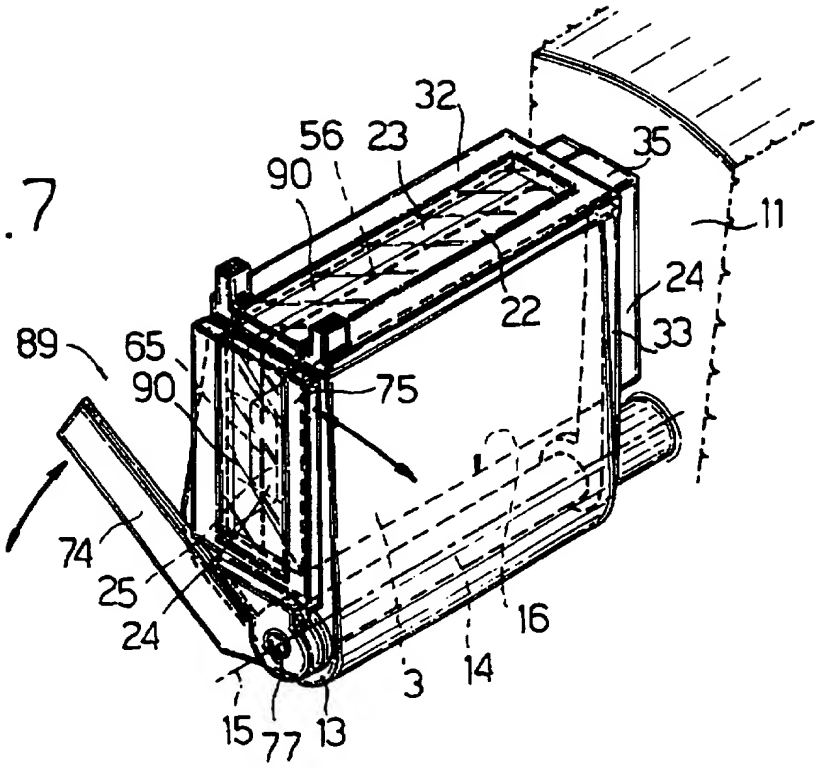
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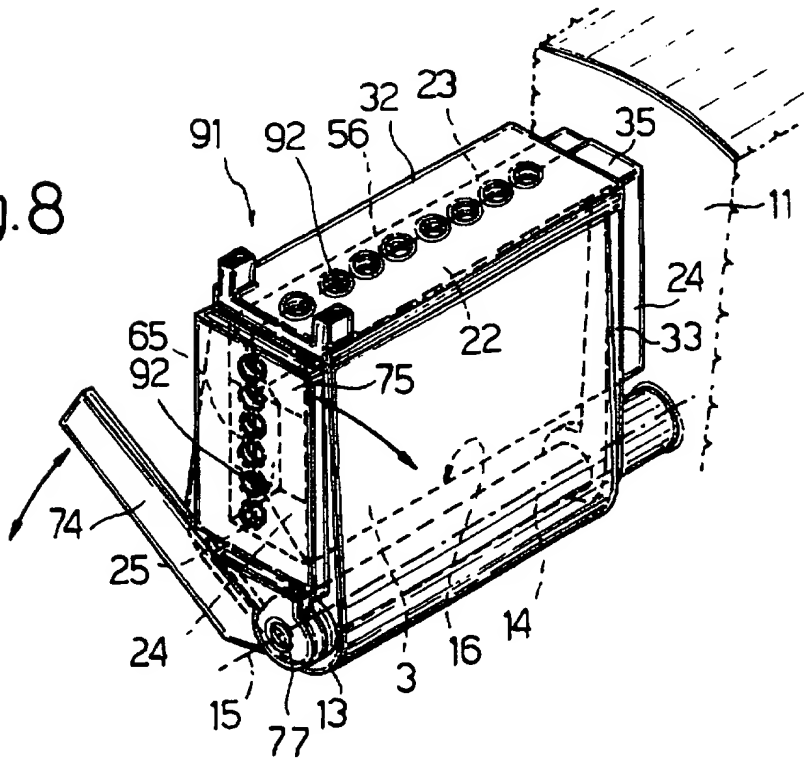
Fig. 8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METHOD AND MACHINE FOR PRODUCING WRAPPINGS FOR PRODUCTS

BACKGROUND OF THE INVENTION

The present invention relates to a method of producing wrapping for products.

In particular, the present invention relates to a wrapping method for producing wrappings for preferably, but not necessarily, parallelepiped products or similar, and which may be used to advantage for producing wrappings of transparent material on machines for wrapping packets of cigarettes.

On known wrapping machines, the above wrappings are normally formed by feeding the products successively in a given direction along a given path, and by feeding, for each product, a sheet of wrapping material across the path and in front of the opening of a radial pocket formed on the periphery of a wrapping wheel, which is rotated in steps about its axis so as to arrest the pockets at an input station of the wheel long enough to receive the product for wrapping.

In general, insertion of the product inside the respective pocket is accompanied by simultaneous insertion of the respective sheet of wrapping material, which is folded gradually into a U about the product as this is fed into the pocket.

On the wrapping wheel, a tubular wrapping is then formed about the product by superimposing the two free ends of the U-shaped sheet along one side of the product; and the two opposite ends of the tubular wrapping are then closed and sealed at an output channel of the wheel to complete the wrapping.

The above known method presents a major drawback, mainly due to the operating speed of the machine. That is, as the operating speed of the machine increases, the sealing time available decreases, so that, to seal the end portions, the temperature of the sealing elements must be increased. With currently used wrapping materials, however, which are relatively thin for environmental reasons, this increases the risk of the wrappings being burned.

To eliminate the above drawback, wrapping wheels have been devised wherein sealing elements are provided for each pocket on the wheel and travel together with the products, thus increasing the sealing time for a given operating speed of the machine. At the same time, however, such a solution greatly complicates the design and hence increases the production and maintenance cost of the machine.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a straightforward, low-cost method designed to overcome the aforementioned drawbacks.

According to the present invention, there is provided a wrapping method for producing wrappings for products, the method comprising the steps of folding a sheet of wrapping material about a respective product, so that at least a first and a second portion of said sheet of wrapping material are superimposed one on top of the other with the first portion outside the second; and connecting said two portions to each other by sealing; the method being characterized in that said connecting step comprises the further steps of compressing said two portions onto each other, and sweeping at least one laser beam along a sealing portion of said first portion.

The present invention also relates to a wrapping machine for producing wrappings for products.

According to the present invention, there is provided a machine for producing wrappings for products, the machine comprising wrapping means for folding a sheet of wrapping material about a respective product, so that at least a first and a second portion of said sheet of wrapping material are superimposed one on top of the other with the first portion outside the second; and at least one connecting means for connecting said two portions by sealing; the machine being characterized by comprising a compressing device for compressing said two portions onto each other; and a laser sealing assembly comprising at least one laser source for emitting a respective laser beam with which to sweep a sealing portion of said first portion.

BRIEF DESCRIPTION OF THE DRAWINGS

A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

FIG. 1 shows a schematic view, with parts removed for clarity, of a first preferred embodiment of the machine according to the present invention;

FIG. 2 shows a larger-scale view, with parts in section and parts removed for clarity, of a detail in FIG. 1;

FIG. 3 shows a larger-scale view, with parts in section and parts removed for clarity, of a second preferred embodiment of the FIG. 1 machine;

FIG. 4 shows a larger-scale view, with parts in section and parts removed for clarity, of a detail in FIG. 3;

FIG. 5 shows a partially sectioned view, with parts removed for clarity, of a detail in FIG. 4 in one operating position;

FIG. 6 shows a partially sectioned view, with parts removed for clarity, of a detail in FIG. 5 in a further operating position;

FIGS. 7, 8 and 9 show partially sectioned views, with parts removed for clarity, of respective embodiments of the FIG. 5 detail.

DETAILED DESCRIPTION OF THE INVENTION

Number 1 in FIG. 1 indicates a wrapping machine for producing wrappings 2 for products 3, in particular packets of cigarettes.

Machine 1 comprises a known input conveyor device 4 and a known output conveyor device 5, for successively feeding products 3 in a given direction 6 and along a wrapping path P extending along machine 1; and a wrapping device 7 located along path P, between devices 4 and 5, and which receives products 3 together with respective sheets 8 of heat-sealable wrapping material fed across path P by a known supply device (not shown) at an input station 9. Products 3 and sheets 8 are fed in steps along an intermediate portion P1 of path P extending from station 9 to an output station 10 of device 7.

As shown in FIG. 2, device 7 comprises a disk 11 supporting a number of wrapping members 12 (only one shown) equally spaced about the axis of rotation (not shown) of disk 11, which axis is located crosswise to direction 6. Disk 11 is powered by a drive device (not shown) to rotate in steps about said axis and transfer members 12 from station 9 to station 10 along path portion P1.

Member 12 comprises a conveying element 13, which is fitted to the front of disk 11 by a tubular pin 14 projecting from disk 11 coaxially with its own axis 15 parallel to said

axis of rotation, and presents a substantially U-shaped pocket 16 for housing a product 3 and a respective sheet 8. More specifically, pocket 16 presents an opening 17 extending on three sides of pocket 16, and is supplied, at station 9 and through an intermediate portion 18 of opening 17, with a product 3 together with a respective sheet 8. As product 3 is inserted inside pocket 16, sheet 8 is folded into a U to form an open tubular wrapping 19 wherein two end portions 20 and 21 of sheet 8 project outwards of opening 17 and in relation to product 3.

Portions 20 and 21 comprise respective longitudinal portions 22 and 23, which, when pocket 16 is at station 9, project rearwards from product 3 in direction 6 and face each other crosswise to direction 6; and respective pairs of transverse portions 24 and 25, which, when pocket 16 is at station 9, project laterally on either side of product 3 and face each other parallel to direction 6. Each transverse portion 24 is connected to respective transverse portion 25 by a respective intermediate connecting tab 26 perpendicular to portions 24 and 25.

Portion 23 is folded squarely onto a larger lateral surface 27 of product 3 by a folding device 28 located at station 9. More specifically, device 28 comprises a folding plate 29, which is moved back and forth in a direction crosswise to direction 6 by an actuator 29*a* to squarely fold portion 23. Two folding plates 30 (only one shown) on either side of path P are moved back and forth in direction 6 by respective actuators 30*a* to fold connecting tabs 26 squarely onto respective smaller lateral surfaces 31 of product 3.

Member 12 also comprises a folding plate 32 fitted to an arm 33 in turn fitted for rotation to pin 14 and connected to a known cam-tappet device (not shown) for rotating plate 32 about axis 15 as member 12 travels along path portion P1, and so partially folding portion 22 squarely onto portion 23 to form a further tubular wrapping 34 presenting tabs 26 contacting respective surfaces 31, and a further two tabs 35 defined by the lateral end portions of folded portions 22 and 23 projecting laterally on either side of product 3 and in relation to surfaces 31. Said cam-tappet device also provides for so positioning plate 32 as to close portion 18 of opening 17 and compress portion 22 onto portion 23 as product 3 travels along path portion P1.

At station 10, said cam-tappet device again moves plate 32 to free opening 17 and enable product 3, together with respective wrapping 34, to be transferred to device 5, which feeds product 3 through a folding station 36, downstream from station 10 along path P in direction 6, and where wrapping 2 is completed, and to a final output station 37 downstream from station 36 along path P.

Station 36 comprises a folding device 38 in turn comprising a pair of fixed folding plates 39 located on either side of path P and for folding tabs 35 squarely onto respective surfaces 31 as product 3 travels through station 36. Device 38 also comprises two pairs of helical plates 40 and 41 for respectively folding portions 25 squarely onto respective surfaces 31, and portions 24 partially onto respective portions 25 to form wrapping 2 as product 3 travels through station 36.

Station 37 comprises an unloading device 42 in turn comprising a substantially U-shaped pocket 43, which presents two lateral walls 44 on either side of path P and for cooperating with and compressing portions 24 onto respective portions 25. Pocket 43 also presents an actuator 45 for moving pocket 43 in a direction 46 crosswise to direction 6 to unload products 3 from station 37.

Machine 1 comprises a laser sealing assembly indicated as a whole by 47 and which provides for sealing portions 20 and 21 to each other. More specifically, assembly 47 comprises a laser sealing device 48 located at a sealing station 49 between stations 9 and 10 along portion P1 of path P. Machine 1 also comprises a further laser sealing device 50 located at a respective sealing station 51 substantially coincident with station 37.

Device 48 comprises a laser source 52 for emitting a laser beam 53, which is preferably only partly focused, by a reflecting and focusing device 54 and through a slit 55 formed in plate 32 parallel to axis 15, onto a sealing strip 56 extending along portion 22 and facing slit 55. Device 54 is fitted to machine 1, over device 7, and comprises a mirror 57, which is rotated about its axis 59 by an actuator 58 to reflect beam 53 through a focusing lens 60 movable with mirror 57, and so sweep beam 53 along strip 56 and seal portions 22 and 23 of wrapping 34 when product 3 is arrested, in use, at station 49.

Device 50 comprises two laser sources 61 on either side of path P and for emitting respective laser beams 62, which are preferably only partly focused, by a reflecting and focusing device 63, through respective slits 64 formed in walls 44 parallel to direction 6, onto respective sealing strips 65 extending along portions 24 and facing slits 64. Device 63 comprises for each source 61 a mirror 66 in a fixed position to the side of path P and for reflecting respective beam 62 through a focusing lens 67 to sweep beam 62 along strip 65 and seal portions 24 and 25 of wrapping 2 when product 3 is fed, in use, through station 51.

Alternatively, device 50 comprises, for each mirror 66, an actuator 68 for rotating mirror 66 and lens 67 about an axis 69 to sweep beam 62 along strip 65 when product 3, in use is arrested at station 51.

Operation of machine 1 is clearly understandable from the foregoing description and therefore requires no further explanation. It should be pointed out, however, that laser sealing of portions 22, 23 and 24, 25 by respective devices 48 and 50 is made possible, firstly, because portion 22 and portions 24 are compressed respectively onto portion 23 and respective portions 25 during sealing, and, secondly, because beams 53 and 62 are only partly focused along respective strips 56 and 65, thus enabling sealing to be performed with no danger of burning, i.e. severing, portion 22 and portions 24.

The FIG. 3 variation relates to a wrapping machine 70 substantially similar to machine 1, except that machine 70 is a continuously-operating machine; portions 24 and 25 projecting from the opposite side of pocket 16 to disk 11 are folded by a folding device 71 forming part of member 12 and fitted to element 13; and strip 65 facing outwards of the opposite side of pocket 16 to disk 11 is sealed simultaneously with strip 56 along sealing station 49.

As shown in FIGS. 5 and 6, device 71 comprises a folding plate 72, which is fitted to a slide 73 integral with and over plate 32, and is moved in a radial direction by an actuator (not shown) to fold squarely onto surface 31 of product 3 the tab 35 defined by the lateral end portions of portions 22 and 23 folded onto surface 27 of product 3.

Device 71 also comprises a further two folding plates 74 and 75 located to the side of a lateral portion 76 of opening 17 on the opposite side of pocket 16 to disk 11, and which are fitted to a shaft 77 mounted for rotation inside pin 14 and oscillating about axis 15 by a known cam-tappet device (not shown). As member 12 travels along path portion P1, the cam-tappet device so moves plates 74 and 75 as to first fold portion 25 squarely onto surface 31 by means of plate 74, and then fold portion 24 partly over portion 25 by means of

plate 75. The cam-tappet device also provides for so positioning plate 75 as to close portion 76 of opening 17 and compress portion 24 onto portion 25 as product 3 travels along path portion P1.

As shown in FIGS. 3 and 4, sealing assembly 47 comprises a further sealing device 78, which replaces device 50 of machine 1, is located substantially over disk 11 at station 49, and provides for sealing portion 24 to portion 25 along strip 65 as product 3 travels through station 49.

Device 78 comprises a laser source 79 for emitting a laser beam 80, which is preferably only partly focused along strip 65 by a reflecting and focusing device 81 and through a radial slit 82 formed in plate 75. Device 81 is fitted to machine 1 facing disk 11, and comprises a mirror 83, which is rotated by a known actuator (not shown) about two perpendicular axes 84 and 85 coplanar with mirror 83, to reflect beam 80 through a focusing lens 86 movable with mirror 83, and so sweep beam 80 along strip 65 to seal portions 24 and 25.

More specifically, said actuator rotates mirror 83 about axis 84 to move and reflect beam 80 parallel to slit 82, and rotates mirror 83 about axis 85 to move and reflect beam 80 as product 3 travels through station 49. In other words, mirror 83 presents an operating movement about axis 84 to move beam 80 along strip 65, and a tracking movement about axis 85 to follow the moving product 3 with beam 80.

Since strip 56 is sealed simultaneously with strip 65 as product 3 travels through station 49, reflecting and focusing device 54 of sealing device 48 described previously also comprises a further actuator 87 for rotating mirror 57 about a further axis 88 perpendicular to axis 59, and so imparting to mirror 57 a tracking movement to move and reflect beam 53 as product 3 travels through station 49. In this case, mirror 57 therefore presents an operating movement about axis 59 to move beam 53 parallel to strip 56, and a tracking movement to follow strip 56 with beam 53 by moving beam 53 crosswise to strip 56. The other two portions 24 and 25 directly facing disk 11 may be folded and sealed by a sealing device (not shown) identical to device 78 and either located symmetrically with device 78 in relation to path portion P1, or downstream from device 78 along path P.

Operation of machine 70 is clearly understandable from that of machine 1 and from the foregoing description and therefore requires no further explanation.

From the foregoing description, and particularly with reference to the operating and tracking movements of mirrors 57 and 83, machine 70 may obviously also be operated in steps, strips 56 and 65 being sealed at each step of member 12.

The FIG. 7 variation relates to a member 89 substantially similar to member 12, except that, as opposed to respective slits 55 and 82, plate 32 and plate 75 present respective elements 90 made of material permitting the passage of laser light, and through which respective beams 53 and 80 travel. Elements 90 also provide for compressing portion 22 onto portion 23, and portion 24 onto portion 25 during sealing.

The FIG. 8 variation relates to a member 91 substantially similar to member 12, except that, as opposed to respective slits 55 and 82, plate 32 and plate 75 each present at least one number of holes 92 facing strips 56 and 65 respectively, and through which respective beams 53 and 80 travel.

The FIG. 9 variation relates to a member 93 substantially similar to member 12, except that plate 75 no longer presents slit 82, and is a sealing element for compressing and sealing portion 24 onto portion 25. In this case, plate 75 performs the functions of device 78, which may therefore be dispensed with; or plate 75 may be made of material permitting the passage of laser light, and be combined with device 78 to seal portion 24 to portion 25.

We claim:

1. A wrapping method for producing wrappings (2) for products (3), the method comprising the steps of folding a sheet (8) of wrapping material about a respective product (3), so that at least a first (20) and a second (21) portion of said sheet (8) of wrapping material are superimposed one on top of the other with the first portion (20) outside the second (21); and connecting said two portions (20, 21) to each other by sealing; the method being characterized in that said connecting step comprises the further steps of compressing said two portions (20, 21) onto each other, and sweeping at least one laser beam (53, 62; 53, 80) along a sealing portion (56, 65) of said first portion (20).

2. A method as claimed in claim 1, characterized by comprising the further step of feeding a product (3) in a given traveling direction (6) along a wrapping path (P) comprising at least one sealing station (49, 51); said connecting step being performed when said product (3) is located at the sealing station (49, 51).

3. A method as claimed in claim 2, characterized in that said sealing portion (56, 65) comprises a transverse sealing strip (56; 56, 65) crosswise to said traveling direction (6); said connecting step comprising the substep of moving the laser beam (53; 53, 80) along the transverse sealing strip (56; 56, 65).

4. A method as claimed in claim 3, characterized in that said connecting step comprises the further substep of arresting said product (3) at said sealing station (49).

5. A method as claimed in claim 3, characterized in that said connecting step comprises the further substep of moving the product (3) through said sealing station (49) in said traveling direction (6).

6. A method as claimed in claim 2, characterized in that said sealing portion (56, 65) comprises a parallel sealing strip (65) parallel to said traveling direction (6); said connecting step comprising the further substep of feeding said product (3), in said traveling direction (6), through said sealing station (51) and past said laser beam (62) located in a fixed position at said sealing station (51).

7. A method as claimed in claim 2, characterized in that said sealing portion (56, 65) comprises a parallel sealing strip (65) parallel to said traveling direction (6); said connecting step comprising the further substeps of arresting the product (3) at said sealing station (51), and moving said laser beam (62) along said parallel sealing strip (65).

8. A method as claimed claim 1, characterized in that said compressing step is performed by means of an external compressing element (32, 44; 32, 75) through which said laser beam (53, 62; 53, 80) travels at said sealing portion (56, 65).

9. A method as claimed in claim 8, characterized in that said external compressing element (32, 44; 32, 75) comprises at least one plate (32, 44; 32, 75) presenting a slit (55, 64; 55, 82) extending along the whole of said sealing portion (56, 65).

10. A method as claimed in claim 8, characterized in that said external compressing element (32, 44; 32, 75) comprises at least one plate (90) made of material permitting the passage of said laser beam (53, 62; 53, 80) and extending along the whole of said sealing portion (56, 65).

11. A method as claimed in claim 8, characterized in that said external compressing element (32, 44; 32, 75) comprises at least one plate (32, 75) presenting at least one succession of holes (92) along the whole of said sealing portion (56, 65).

12. A method as claimed in claim 2, characterized in that said connecting step comprises two sealing steps; said sealing portion (56, 65) comprising a first (56) and a second (65) sealing strip; the first sealing strip (56) being a transverse sealing strip (56) crosswise to said traveling direction (6); and the second sealing strip (65) being a parallel sealing strip (65) parallel to said traveling direction (6).

13. A method as claimed in claim 12, characterized in that one of said two sealing steps comprises the substep of sweeping a respective laser beam (53) along said first sealing strip (56) located in a fixed position at a respective sealing station (49).

14. A method as claimed in claim 13, characterized in that one of said two sealing steps comprises the substep of sweeping a respective laser beam (62) along said second sealing strip (65) located in a fixed position at a respective sealing station (51).

15. A method as claimed in claim 13, characterized in that one of said two sealing steps comprises the substep of moving said second sealing strip (65) through a respective sealing station (51) and past a respective laser beam (62) located in a fixed position at the sealing station (51).

16. A method as claimed in claim 2, characterized in that said connecting step comprises two sealing steps; each of said two sealing steps forming a seal along a respective sealing strip (56, 65) positioned crosswise to said traveling direction (6).

17. A method as claimed in claim 16, characterized in that said two sealing steps are performed simultaneously at a sealing station (49).

18. A method as claimed in claim 17, characterized in that said two sealing steps each comprise the substeps of feeding a product (3) through said sealing station (49), and tracking the moving product (3) with a respective laser beam (53, 80).

19. A method as claimed in claim 17, characterized in that said two sealing steps each comprise the substeps of arresting a product (3) at said sealing station (49), and sweeping a respective laser beam (53, 80) along the respective sealing strip (56, 65).

20. A method as claimed in claim 1, characterized in that said laser beam is only partly focused.

21. A machine (1; 70) for producing wrappings for products (3), the machine (1; 70) comprising wrapping means (7) for folding a sheet (8) of wrapping material about a respective product (3), so that at least a first (20) and a second (21) portion of said sheet (8) of wrapping material are superimposed one on top of the other with the first portion (20) outside the second (21); and at least one connecting means (47) for connecting said two portions (20, 21) by sealing; the machine (1; 70) being characterized by comprising compressing means (32, 44; 32, 75) for compressing said two portions (20, 21) onto each other; and a sealing assembly (47) comprising at least one laser source (52, 61; 52, 79) for emitting a respective laser beam (53, 62; 53, 80) with which to sweep a sealing portion (56, 65) of said first portion (20).

22. A machine as claimed in claim 21, characterized by comprising conveying means (4, 5, 7) for feeding a product (3) in a given traveling direction (6) along a wrapping path (P) comprising at least one sealing station (49, 51); said laser source (52, 61; 52, 79) emitting the respective laser beam (53, 62; 53, 80) when said product (3) is located, in use, at the sealing station (49, 51).

23. A machine as claimed in claim 22, characterized in that said sealing portion (56, 65) comprises a transverse sealing strip (56) crosswise to said traveling direction (6); said connecting means (47) comprising reflecting and focusing means (54) for sweeping said laser beam (53) along the transverse sealing strip (56) as said conveying means (4, 5, 7), in use, feed the product (3) through said sealing station (49).

24. A machine as claimed in claim 22, characterized in that said sealing portion (56, 65) comprises a transverse sealing strip (56) crosswise to said traveling direction (6); said connecting means (47) comprising reflecting and focusing means (54) for sweeping said laser beam (53) along the transverse sealing strip (56) upon said conveying means (4, 5, 7) arresting the product (3), in use, at said sealing station (49).

25. A machine as claimed in claim 22, characterized in that said sealing portion (56, 65) comprises a parallel sealing strip (65) parallel to said traveling direction (6); said connecting means (47) comprising reflecting and focusing means (63) for reflecting said laser beam (62) onto the parallel sealing strip (65) as said conveying means (4, 5, 7) feed the product (3), in use, through said sealing station (51).

26. A machine as claimed in claim 22, characterized in that said sealing portion (56, 65) comprises a parallel sealing strip (65) parallel to said traveling direction (6); said connecting means (47) comprising reflecting and focusing means (63) for sweeping said laser beam (62) along the parallel sealing strip (65) upon said conveying means (4, 5, 7) arresting the product (3), in use, at said sealing station (51).

27. A machine as claimed in claim 21, characterized in that said compressing means (32, 44; 32, 75) comprise at least one external compressing element (32, 44; 32, 75), which is superimposed on said sealing portion (56, 65), and through which said laser beam (53, 62; 53, 80) travels.

28. A machine as claimed in claim 27, characterized in that said external compressing element (32, 44; 32, 75) comprises at least one plate (32, 44; 32, 75) presenting a slit (55, 64; 55, 82) extending along the whole of said sealing portion (56, 65).

29. A machine as claimed in claim 27, characterized in that said external compressing element (32, 44; 32, 75) comprises at least one plate (90) made of material permitting the passage of said laser beam (53; 53, 80), and extending along the whole of said sealing portion (56, 65).

30. A machine as claimed in claim 27, characterized in that said external compressing element (32, 44; 32, 75) comprises at least one plate (32, 75) presenting at least one succession of holes (92) along the whole of said sealing portion (56, 65).

31. A machine as claimed in claim 22, characterized in that said sealing assembly (47) comprises two laser sealing devices (48, 50) located at respective sealing stations (49, 51); said sealing portion (56, 65) comprising a first (56) and a second (65) sealing strip; the first sealing strip (56) being a transverse sealing strip crosswise to said traveling direction (6); and the second sealing strip (65) being a parallel sealing strip parallel to said traveling direction (6).

32. A machine as claimed in claim 31, characterized in that one (48) of said two sealing devices (48, 50) comprises a reflecting and focusing device (54) for sweeping a respective laser beam (53) along said first sealing strip (56) located in a fixed position at a respective sealing station (49).

33. A machine as claimed in claim 32, characterized in that one (50) of said two sealing devices (48, 50) comprises a reflecting and focusing device (63) for sweeping a respective laser beam (62) along said second sealing strip (65) located in a fixed position at a respective sealing station (51).

34. A machine as claimed in claim 32, characterized in that one (50) of said two sealing devices (48, 50) comprises

a reflecting and focusing device (63) for reflecting said laser beam (62) onto said second sealing strip (65) as said conveying means feed the product (3), in use, through a respective sealing station (51).

35. A machine as claimed in claim 22, characterized in that said sealing assembly (47) comprises two laser sealing devices (48, 78) at a single sealing station (49); each of said sealing devices (48, 78) forming a seal along a respective sealing strip (56, 65) crosswise to said traveling direction (6).

36. A machine as claimed in claim 35, characterized in that each of said two sealing devices (48, 78) comprises a respective reflecting and focusing device (54, 81) for sweeping a respective laser beam (53, 80) along the respective said sealing strip (56, 65) as said conveying means feed a product (3), in use, through said sealing station (49).

37. A machine as claimed in claim 35, characterized in that each of said two sealing devices (48, 78) comprises a respective reflecting and focusing device (54, 81) for sweeping a respective laser beam (53, 80) along the respective said sealing strip (56, 65) upon said conveying means (4, 5, 7) arresting a product (3), in use, at said sealing station (51).

38. A machine as claimed in claim 21, characterized in that said laser beam is only partly focused.

* * * * *

D. EVIDENCE APPENDIX

No affidavits or evidence under §§1.130, 1.131 or 1.132 was presented during the prosecution of this application and, therefore, none are submitted in this Appendix.

E. RELATED PROCEEDINGS APPENDIX

No decisions have been rendered in a judicial proceeding by a court or the Board in the United States related to this application and, thus, none are submitted in this Appendix.